Vol. III. February, 1937 No. 2.

DISEASES OF THE CHEST

(A MONTHLY PUBLICATION)

Official Organ of the Federation of American Sanatoria
Editorial offices 1018 Mills Building, El Paso, Texas
Business Address Myrtle at Virginia, El Paso, Texas

Subscription: United States and Canada $2.00 per year. Other countries $2.50 per year.
Entered as second-class matter August 18, 1936, at the post office at El Paso, Texas, under the Act of August 24, 1912.

"The most important factor in diagnosis in the majority of cases of pulmonary tuberculosis is keeping the disease in mind."

Lawrason Brown, M. D.

Editorial Comment

Public Health

DURING THE PAST two decades the program of Public Health has broadened considerably. The stress of hygenic effort has tended to shift from community to individual. This has been partly due to new methods of disease control made possible by advances in immunoulogy. By this shift and emphasis the importance of the practitioner has been greatly increased. Immunology has now provided preventative inoculation against diphtheria and typhoid fever, as well as against small pox. The success of the campaign against tuberculosis by organized case finding, as well as prevention, has led to organized campaigns against cancer, heart disease, venereal diseases and mental illness. The drive against syphillis and other venereal diseases is being particularly emphasized at the present time by the Surgeon General of the United States Public Health Service.

There has been a shift in recent years of emphasis in practical medicine, from treatment to prevention. This shift must be recognized and accepted by the practitioner because he should hold the key to the situation. Just as the drive against tuberculosis, in many instances, took the situation out of the hands of the private physician because he was not alert to the changing aspect of things, medically, he should now hold himself in readiness to meet these new organized drives and hold first place by cooperating in every way that will actually improve the public health.

C. M. H.

Economics in Sanatorium Control

IT HAS ALWAYS been a puzzle to us why a municipality would expect other municipalities which have sanatoria to contract for their tuberculous citizens at a figure less than what it would cost them to build and maintain their own institution.

Why sanatoria now in operation should want to enter into such contracts has also been a puzzle to us; and yet there are many institutions which are accepting patients from other municipalities at less than the actual per diem cost of operation. Where these institutions are tax-supported, naturally the deficit is paid for by the tax-payers who maintain the institution. In the case of privately owned institutions, the patients who pay the regular fee must make up this deficit.

In figuring the per diem cost per patient, many institutions are wont to estimate only the cost of food and medical care. We wish to remind these institutions that such an estimate does not constitute the complete cost of operation since the cost of buildings, equipment, depreciation, replacements, and insurance are not taken into consideration. These, as well as a fair return on the capital invested, must be included in any comprehensive estimate of the per diem cost of operation for any institution.

Although this would increase the costs to the municipalities who do not have their own sanatoria and who desire to contract for the care of their tuberculous citizens, it would still be less expensive than the cost of building and maintaining new institutions.

The State of Colorado, at the last election, voted to establish a fund for the hospitalization of its tuberculous citizens in existing sanatoria throughout the state. This seems to us to be good common sense.

As a possible remedy for some of these conditions, we believe that a national conference, with adequate representation from every sanatorium, should be called. At this conference, plans should be formulated which would effect a working basis, fair to each of the institutions concerned.

Recent surveys show that some states have a long list of patients waiting for admittance to sanatoria while other states have vacant beds. Why can't some plan be worked out, through a federal registration bureau, so that every available bed will be utilized in our fight against tuberculosis?

A conference as suggested above, could lay the groundwork for the establishing of such a bureau.

Instead of state competing against state and county competing against county for the building of beds and more beds; let us have more intelligent cooperation and let us make full use of the present facilities in a concerted fight against tuberculosis. M. K.

Asthma AS A CAUSE of death bronchial asthma is not particularly significant; as a cause of serious illness and invalidism it is an extremely important disease. It has been estimated by Soud that approximately three and one-half per cent of all persons in the United States suffer from hay fever or asthma. Others have placed this figure at five per cent. Often the patient has hay fever during early adulthood and asthma in late middle life. It is said that there are more than half a million cases of asthma constantly in this country.

It is believed that asthma results from the interplay of two factors—one an inherited tendency (diathesis), the other an acquired reaction to some specific allergen or allergens. Concerning the inherited factor we can do nothing for the individual patient. Concerning the acquired factors—hypersensitivity to specific allergens—we may be able to do two things. By appropriate tests—intradermal tests, scratch tests, elimination diets, etc.—we can determine what substances are causing the patient's asthma. If we can then separate the patient from these substances he will have no more asthma. Failing to do this—and often such separation is an impossibility—we must proceed along other lines.

It is often possible to desensitize the patient to the chief offending substances causing his asthma. This is done by giving—by mouth, by injection, or by other means—minute doses of the allergen—so minute that they cause no outwardly discernable reaction. Gradually such doses are increased until at last the patient can tolerate the amounts of this specific substance which he meets in his usual daily routine. Such desensitization treatment is fairly effective and should be tried in all cases. In the interim between onset of asthma and the time of complete desensitization the patient may have many attacks of asthma. For these he will be in urgent need of symptomatic relief. Inability to draw into the lungs the necessary amount of air gives the patient a terrible fear of suffocation, causing insomnia, nervousness, and often leading to a definite neurosis with loss of economic independence. For these reasons effective symptomatic treatment assumes a position of great importance in the handling of asthmatic patients.

A recent addition to the various methods of symptomatic treatment has been the inhalation of adrenalin chloride in 1-100 solution as advocated by Graeser and Rowe.

A Warning! IN THE SURGE of our enthusiasm for collapse therapy, there has arisen what I feel is a decided need for proclaiming a warning. In no sense do I mean that we have created a Frankenstein that threatens to boomerang destructively against us. Collapse therapy is the order of the day. It has revolutionized the care, treatment and rehabilitation of the tuberculous sick; and is lifting the curtain of despair to permit the rays of hope and courage to beam from a more distant horizon. It should be administered however by only those who have familiarized themselves with it. Therein lies this caution. It is not for the inexperienced tyro. The indiscriminate and unskilled plunging of needles into the thoracic cavity is fraught with danger, and likewise tends to discredit this most laudible procedure of collapsing the lung — Pneumothorax. The performance of the simple operation on the phrenic nerve, calls for a skilled technique and a profound knowledge of the anatomy of the vital structures exposed in a resection of the neck. The training in collapse therapy is readily available, and let it again be urged that only those who are competent, engage in it. C. H. H.

Health Insurance UNDOUBTEDLY within the next few months the question of Health Insurance will come up as an added provision of the Social Security Act.

Recently, a letter by the President of a leading state medical society, has come to our attention. This letter, in our opinion, approaches the subject in an ideal manner. The letter was addressed to The Social Security Board. The letter is as follows:

"The medical profession of (Blank) has read with considerable interest the announcement that a study of health insurance is to be carried out by your board. We desire to cooperate with you in any survey that you make, and believe we can assist effectively.

"We are ever mindful of our responsibility to provide our people with the best possible medical service at reasonable cost. To that end, you will find us receptive to new methods for service distribution, provided they adhere to the basic tenets of better medical care.

"In a general way, the profession is opposed to health insurance for the reason that it believes such measures result in a system of inferior medical service at no saving in cost, and place physicians under the supervision and control of a lay bureaucracy, as has been done repeatedly in those countries where it has been introduced.

"Physicians are quite willing to admit, however, that there is real need for a better distribution of medical service to the low-wage earner and to the indigent. This group is no longer a small by-product of society which can be cared for gratis by the medical profession. At times, demands of these groups for free medical service reach the proportions of a Frankenstein. We do not wish to be obstructive in any movement which provides serious consideration of the public welfare, and you will find us more than willing, to assist in a carefully-planned study of ways and means to deliver better medical care.

"In the health provisions of the present Social Security law, our medical society has cooperated wholeheartedly. We believe that our program for public health, maternal welfare, child health, crippled children, and venereal disease is at least on a par with that of any other state, and in this program the medical men of (Blank) are taking a most active part.

"We offer our assistance in conducting a study of health insurance needs and their application in (Blank) and can assure you that we are organized to take an active and effective part. We are ready to experiment in specific projects or plans which you might propose.

"Finally, we respectfully urge your board not to endorse any plan for health insurance without careful study in which the medical profession will be given a full opportunity to participate, criticize constructively, and evaluate." C. M. H.

More About the Endocrines, in the Active Treatment Of Pulmonary Tuberculosis * PART II.

BY
F. W. DIRMANN, M.D.
San Antonio, Texas

MY HYPOTHESIS on the active treatment of pulmonary tuberculosis with endocrines needs further explanation and I propose to attempt this by using anatomical and biochemical reasoning.

In reviewing the medical literature on tuberculosis one is finally impressed with the looseness and ambiguity of the terms *constitutional pre-disposition, resistance, relative immunity* and *immunity,* when in all probability there is no real existance of specific immunity *per se.* If the functions of the endocrines are the factors in the determination of predisposition or resistance to active tuberculosis, I might suggest that for the sake of convenience and uniformity we speak of "vital resistance" of the individual, which is necessarily relative in degree.

We can only hope for inactivity and the arrest of the disease, either spontaneously or through active medical or surgical treatment, and not for a positive cure.

In connection with this theory I made mention of the controlling powers of the endocrines over the lymphatic system and will later refer to their controlling influence over the enzymes. Tuberculous lymphadenopathy known by the ancient name of scrofula bears a relationship to tuberculosis in later life according to recent information. Since the lymphatics do sentinel duty for the body, and since the endocrines are so important in body economy and metabolism, a controlling influence of the latter over the former must exist if infections are to be dealt with satisfactorily.

Bartel and Eschrich have shown that scrofula is a form of infantile tuberculosis which occurs only in subjects possessing the lymphatic diathesis. If such is the case, there is one thing certain—that scrofulous children rarely develop pulmonary tuberculosis in later life and when a lung lesion does occur it runs a very mild course and tends to cicatrization, a fact which was already observer by clinicians several generations ago.

We must also remember that other children who do not present characteristics of the lymphatic constitution are also able to resist this disease, thus explaining a difference of degree in "vital resistance," if we assume that the approximate number and degree of virulence of the micro-organisms causing the infections are the same.

A comprehensive understanding of the migration or movements in vivo of the tubercle bacillus should be gleaned from the following: Whether the micro-organism gains entrance by way of the nose, throat and mouth, bronchi, or intestinal tract, it is "picked up" by the lymphatics and deposited in the regional lymph-nodes. This function is essential to human existence.

Studies carried out in Dr. Allen K. Krause's laboratories in Baltimore have shown the presence in the walls of the larger bronchi of small nests or pockets of lymphatic tissue, covered only by a thin layer of bronchial mucosa. Krause believes that these islands of lymphatic tissue drain the bronchial mucosa; that tubercle bacilli which invade them are carried thence through lymphatic channels into the thoracic duct which, in turn, conveys them to the venous blood stream in the neck, whence they ultimately find lodgement in the pulmonary tissue by way of the pulmonary artery. It is quite conceivable that pyogenic organisms also find their way into these islands of lymphatic tissue, whence they, too, may reach the lung by way of the pulmonary artery.

These small islands of lymphatic tissue

*"Published with the permission of the Medical Director of the Veterans Administration, who assumes no responsibility for the opinions expressed, or the conclusions drawn by the writer." Continued from January, 1937, Vol. III, No. 1.

may also be invaded by a more virulent organism which destroys the lymphatic tissue and the contiguous pulmonary tissue, resulting in suppuration and destruction.

The destruction of these pockets of lymphatic tissue by a bronchogenic spread or extension of the infection could well result in multiple saccular dilatations of the bronchi or in honeycombed cavitations.

I agree with the above in part but am satisfied that nature did not intend such an easy surrender to so formidable a foe as the tubercle bacillus. My belief is that the virus under the circumstances of ordinary infection penetrate the mucosa of the larger bronchi, are retarded in the submucosal islands or nests, and from there are carried through lymphatic channels into the regional lymph glands known as tracheo-bronchial lymphnodes —situated in the chest.

The manifestations of scrofula, active tracheo-bronchial lymphadenopathy or mesentric tuberculous lymphadenoma, would indicate a local fight on the part of these glands as a result of some degree of virulence of the micro-organism or some degree of impairment of the endocrine balance, or both. These micro-organisms are carried to the lymphatic glands by afferent vessels; they might escape the first line of defense, and then be carried out into the efferent lymphatic vessels into the next gland, and this undoubtedly explains why several of the glands are involved. They may be so small as to be hardly palpable, but in others they become visible, and in extreme cases, two chains of enlarged glands are seen on both sides of the neck adherent to one another and to the skin.

Now an important factor to my mind is the next step—the invasion of the body by the micro-organism. While these are retained by the lymphatic glands in active disease, a bitter struggle ensues, but some of the micro-organisms are "spilled" into the venous blood and are carried by means of veins to the right side of the heart and thence to the lungs by means of the pulmonary artery. This phenomenon does not necessarily indicate collapse of "vital resistance." The lymphatic glands are supplied with arteries and veins as all tissues of the body are. Even though the proximal lymphatic channels, or terminal efferent lymphatic vessels, would pick the tubercle bacilli up, they would still be conveyed to the right side of the heart and thence to the lung parenchyma by way of the pulmonary artery.

This phase of advancement of the bacilli from the lymphatic vessels to the lung by way of the pulmonary artery is either misconstrued or misrepresented in most data on this subject. The Ghon spoken of so often is described as the primary focus, but in reality is one of the foci in the secondary stage. It becomes necessary to digress a little at this point to explain further this dissemination in the body of the tubercle bacilli. The pulmonary artery carries impure blood through the lungs for oxidation (giving off CO^2 and taking up O) and expelling any innocuous micro-organisms that happen to be present at that time. Therefore, to serve this physiological and protective purpose, the terminal branches of this vessel must consist merely of a very thin, delicate, and permeable wall or membrane. Periarterial lymphoid aggregations occur but they may be scarcer around arteries in which the blood current is swifter than around the veins, in which the current is considerably retarded. It is at this point in the arterial bed of the lung that implantation of the tubercle bacilli takes place, and the lesion is a tubercle or Ghon, involving one or more lobules. Here again if germs should escape and not enter the terminal bronchioles, alveolar passages, or alveoli, they would be engulfed by the lymphatic vessels and brought to the regional lymph glands rather than be allowed to escape into the lung parenchyma. This lymphoid tissue surrounding the veins may be more ample because foreign and irritating materials that enter the alveoli through the inspiratory act, must be acted upon and removed if they escape from the veins. Some of the micro-organ-

isms may circulate through the pulmonary veins directly from the pulmonary artery to the left side of the heart, thus completing their travel through the lesser circulation, thence through the aorta and its branches, precipitating hematogenous metastases in the bones, joints, kidneys, etc., via the greater circulation. The Ghon is, therefore, one of the secondary lesions, as it will be designated in this article, and it tends to disappear spontaneously and completely, or to become calcified as do the lymphatic glands, because the "vital resistance" is high because of a satisfactory function of the endocrine glands which prevent the inroads of the virus or stimulate repair when damage is done.

It is stated that the bacilli are not walled off as securely in the Ghon as was formerly thought. By absorption of the calcium and magnesium barriers, the bacilli may again become reactivated locally, or transported to the right side of the heart through the lymphatics or veins that drain the lymphatic glands to the lung tissue, establishing in either case active pulmonary tuberculosis. This represents the phase of isolated organ tuberculosis, so often referred to as the tertiary stage. Here is where the first really serious break in the designated "vital resistive forces" of the human organism takes place, and the tubercle bacilli assume the ascendency.

The following is the crux of the situation producing the lung lesion or lesions known as active pulmonary tuberculosis. According to Aschoff, the terminal bronchioles divide into respiratory bronchioles, under which term are understood those bronchioles which are lined by ciliated or cubical epithelium on the side on which the artery lies while alveoli are present on the other side. The respiratory bronchioles subdivide into similar respiratory bronchioles of the second and third order. Each respiratory bronchiole of the third order divides dichotomously into two alveolar passages, which contain muscle in their walls. The alveoli passages each divide dichotomously into two further orders of alveolar passages and these finally terminate in the alveolar sacs, which are devoid of muscle; moreover, active phthisis does not begin as a catarrh of the small bronchi, as some believe, but as an infiltration, a caseous bronchopneumonic process involving one or more lobules of the parenchyma, transforming the normal porous air-containing and resonant lung into solid non-resonant tissue. At this state the alveoli are filled with exudate, or the interstitial tissues contract and compress the alveoli, finally obliterating them altogether. So long as the infiltration remains beneath the mucous membrane of the bronchi, the entrance of air into the alveoli of the affected area is not interfered with very much, while in the rest of the lung it is freely circulating.

It is only when the caseous material of the infiltrate softens and breaks through the wall of the bronchus, thus permitting the entrance of air into the diseased focus proper, that rales can be heard on auscultation. At that time tubercle bacilli make their appearance in the sputum. When we hear rales we may be sure that we are dealing with a more or less advanced stage of the disease—caseation and softening already having taken place. Many vaunted schemes and so-called sovereign remedies of the past and present have ignored the traditional therapeutic triad in the management of the disease. Rest, fresh air, and good food on the contrary become an essential part of this treatment as will be shown later on. This is what Fishberg has to say in his textbook on pulmonary tuberculosis, Volume I, page 126: "In the search for the factors predisposing to phthisis many have looked into the metabolism of the body stating that tuberculous infection is harmless in the vast majority of persons, so long as the metabolic processes are normal; only when certain disturbances occur in this regard can phthisis develop. It is, however, a fact that in the enormous literature on the subject of tuberculosis, we cannot find an exhaustive study of the metabolism of persons affected with the disease, and hardly any-

thing about the metabolism in the so-called pre-tuberculous stage."

Immunity attempts have been carried out along the following lines:

1. By injecting virulent tubercle bacilli.
2. By injecting avirulent or attenuated tubercle bacilli.
3. By injecting dead bacilli.

Administering the latter will probably do no harm and certainly no good, but injecting virulent or avirulent tubercle bacilli or introducing them into the human body by any method is not only ineffective in producing immunity, but extremely dangerous. We are waging a fight to prevent infections and the above methods (Numbers 1 and 2) would be producing infections instead of encouraging the desired immunity. Healing in tuberculosis must come from two separate processes: fibrosis and calcification—fibrosis from the fixed tissue cells and calcification by chemical reaction and deposition of lime and magnesium salts. A third method of healing, but little recognized until recently, is that of absorption, somewhat analagous to the resolution seen in pneumonia.

The ductless glands preside over these functions through enzymic action. These enzymes are scattered throughout the body and are probably specific; and whether they are insufficiently produced or relatively weak because the necessary stimulating influence of the endocrines are lacking, their administration to active tuberculous patients is encouraged, either in combination or as a single gland product, if unquestionable experimental and clinical data will establish their actual worth. There is no depletion of calcium in the blood plasma in tuberculosis; the difficulty comes from lack of its utilization.

Conclusions:

1. I am in complete agreement with Krause who states that in the submucosa of the larger bronchi, small nests or pockets of lymphatic tissue exist which are protective in nature, and I believe that the tubercle bacillus penetrates the mucosa of the larger bronchi. This point of penetration and the involvement of the appertaining tracheo-bronchial lymph-nodes constitutes the "primary complex."

2. A secondary stage, with hematogenous metasteses, of which the Ghon is an integral part.

3. A tertiary stage, with isolated organ tuberculosis.

4. The lymphatic system is the first line of body defense after the skin or mucosa has been penetrated; the lungs are lavishly supplied with lymphatics superficial and deep networks which intercommunicate. Lymphoid aggregations occur throughout the lung in the sites of the subpleural, peribronchial, periarterial, and perivenous systems.

5. If we recognize the fact that the mucous membranes of the mouth, nose and throat, or intestinal tract act as portals of entry of the tubercle bacillus, the asumption that the Ghon is the primary lesion is incorrect, because the micro-organisms under these circumstances will be carried to the cervical or mesenteric lymph glands first, and this invasion constitutes the primary focus of infection.

6. When infection takes place with tubercle bacilli, the resistive powers of the organism will be determined by the inherent qualities of the ductless glands. These shades of difference in the strength of the endocrines probably explain the reasons for various stages of the disease, and when the endocrines are seriously impaired, the body loses control of the situation until active pulmonary tuberculosis becomes an actuality.

7. The theory of the dysfunction of the endocrines as a causative factor in pulmonary tuberculosis is not only plausible, but rationally sound, but this announcement should not be hailed by an enthusiastic medical profession or laity feverishly waiting for some remedy that is universally applicable in tuberculosis; on the contrary its soundness and worth must be appraised through research and experimentation and finally clinical application.

What are we waiting for?

If we will only put the idea of immunity in tuberculosis aside and attack the problem along a different front, namely, endocrinology and endocrine therapy, I have no doubt that our efforts will be ultimately crowned with success so that the dark path of tuberculous disease may be brightly illuminated by the flares of medical accomplishment and progress.

The following is the chemical contribution to the theory of endocrine therapy in active tuberculosis. It is offered by Mr. Samuel A. Owen, of Albuquerque, New Mexico. Mr. Owen is a registered pharmacist and laboratory technician (Bacteriology) and is connected with the U. S. Veterans Administration Facility there:

Cystine appears to be an amino acid which should be regarded with consideration in the breaking down and building up of diseased tissue and in particular with regard to tuberculosis. Cystine is one of the four known amino acids which cannot be synthesized in the body, lysine, tryptophane and tyrosine being the other three. It is also questionable as to whether histidine and proline can be synthesized.

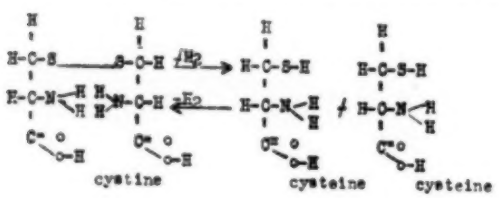
This being the case, it is apparent that cystine must be amply present in the diet if the patient is to be properly nourished. It is also generally recognized that cystine plays an important role as a detoxitizing agent in the body.

Cystine and cysteine are the only sulphur-containing bodies resulting from the hydrolysis of simple protein.

Cystine dissolves readily in mineral acid and alkalis, but is insoluble in acetic acid.

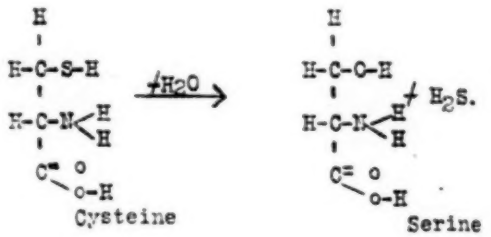
Upon reduction, cystine is converted into two molecules of cysteine, which, however, in the air or in alkaline solution readily oxidize to cystine.

This would indicate this acid has a



profound influence in the oxidation and reduction reactions carried on in the cell metabolism.

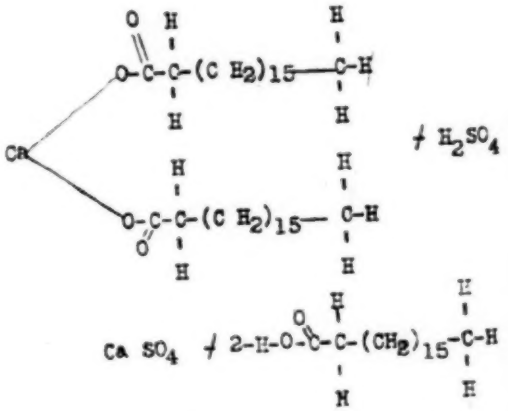
Lusk believes that all six carbon atoms of cystine may enter into the formation of sugar in the diabetic organism. This probably happens through the early conversion of cystine into cysteine, and then perhaps into serine:



If this reaction actually occurs, it would appear that mild doses of insulin might be beneficial in tautomarizing this formed sugar into glycogen.

If, however, this is not taken care of it may be probable that iodine contained in the thyroxin may be utilized by nature's process to relieve the congestion; if this reaction occurs it may possibly be that the carbon chain residues may be synthesized into complex chains and tend to develop alcohols of the high series comparable to waxes.

The H_2S is then oxidized to sulphate and it is possible that this substance reacts with the caseous material which is an emulsion similar to a soap, in this case a calcium soap.



It may also be possible that condensation of these fatty acids may produce the

(Continued to page 30)

Standardization of Tuberculosis Case Finding Procedure in Schools*

BY
CHAS. I. SILK, M.D.
Perth Amboy, New Jersey

THE PURPOSE of this discussion is to formulate, as far as feasible, a uniform method of procedure and to establish such minimal standards in our efforts to uncover tuberculosis in the public school system, as will be productive of best results with a minimal expenditure of effort, time, and money. All of this should be in harmony with present-day knowledge and our aim should be pragmatic rather than academic. As now practiced, the tuberculosis case-finding program in the public schools is a haphazard affair. Much interest has been aroused in the public mind concerning the tuberculin test and x-ray examination of the chest in school children; but no clear cut idea prevails as to their significance, what ultimate results may be expected, or how to obtain them.

The Approach.

Everyone will agree that a preliminary educational campaign is an essential part of the program. Mr. Whealdon, on a previous occasion, related to us how to make spinach palatable—a very useful and practical thing; however, palatability must not be permitted to supersede a clearly defined and properly evaluated utility. In common parlance, there should be less "ballyhoo," less exaggeration of benefits to be derived and less vagueness regarding procedures or costs involved. There should also be less high-pressure salesmanship and more plain, understandable language. We must insist that to be of real benefit, the tuberculosis case-finding process must be a continuous yearly affair, conducted only by competent personnel and for economy's sake limited to definite age groups, including, of course, teachers and nurses.

*Read at the Annual Conference of the New Jersey Tuberculosis League, Trenton, October 1935.

The Objective.

It will be taken for granted that the first and main object in subjecting large groups of people to the tuberculin test and x-ray examination of the chest is to find open tuberculosis in its communicable stage so a to shut off at their sources the fountains of infection; the second object is to find some cases in the minimal stage so that they may be more readily cured and thus prevented from becoming hopelessly advanced. The third object is to find the borderline cases so that they may be warned of impending danger and given proper advice. The fourth object is to prevent the reactor from contributing to familial or other sources of infection.

Groups to be subjected to these Examinations.

First, school personnel of all grades who are in close contact with the children, namely teachers and nurses. What benefit can be derived from finding hundreds or thousands of cases of primary "childhood type" tuberculosis which is non-infective in character, and then allow these to be repeatedly re-infected by some teacher or school nurse with undiscovered open tuberculosis? Harrington, Meyers and Levine report as follows: "Ickert found 93.5 per cent of children reacting positively when exposed to tuberculous teachers against 25 per cent when not so exposed. Klein found 72 per cent reactors among such children when exposed, while Frost found 71 per cent reacting positively, against 11.4 per cent when not so exposed."

In Minnesota, out of 2466 members of the school personnel examined, 78 were found with parenchymal lesions; 3 of these were far advanced, 4 moderately advanced, and 61 minimal. Minnesota is known to have a low incidence of tuberculosis

Our emphasis must therefore be on the finding of the open adult type of tuberculosis. Some appropriate legislation along these lines seems highly desirable. Children under fifteen rarely have serious clinical pulmonary tuberculosis excepting in infancy. Because of economic and practical considerations we should limit ourselves to the age groups around fifteen and over. Dr. Jay A. Myers has clearly shown the impracticability of the procedure in the lower age groups and has wisely acted upon his findings which cover an extended period at the Lymanhurst school in Minnesota by discontinuing the practice of x-raying children below the age of 12 years.

The Tuberculin Test.

It is a far cry from the scratch technique of Von-Pirquet with old tuberculin (O.T.) and the various other tuberculin tests that have been evolved since then, to that of the intradermal method of Mantoux with purified protein derivative (P.P.D.). There is, however, no agreement in technique, dosage, or number of tests applied in these surveys. Some workers still cling to the original Von Pirquet test although the Mantoux, because of its greater accuracy, is deservedly gaining in popularity and is therefore used most frequently. The dilutions of O.T. used vary according to individual preference from 1 to 100,000 to 1 to 100, and even 1 to 10; but the accepted quantity actually injected is quite uniform, i.e., 1/10 c.c. for those over the age of 5 years and .0.05 c.c. below that age. The number of injections depend on the initial dilution used. Previously it was routine to begin with 1/100,000 or 1/10,000 so as to avoid severe reactions. This was followed by 1/1,000 and finally by 1/100, making three injections in all. The experiences of many workers in many different places taught us that in mass testing, a dilution of 1/1000 O.T. or its equivalent of P.P.D. will result in approximately 95 per cent of all possible reactions without producing extremely severe ones and this has been the trend followed lately by most workers. While we cannot subscribe to the general impression gained from some authorities that the 5 per cent reactors to the stronger solution of 1/100 thus missed are of no diagnostic importance anyway, we do believe that as a screening process a 95 per cent efficiency is quite satisfactory; remembering that some of the reactions will be fairly severe though not disabling. In our private and clinic work, however, we should insist on a second test when the first proves negative, beginning with a higher dilution followed with a 1/100 dilution.

O.T. is in itself a product of variable potency which cannot be accurately standardized and P.P.D. is the only alternative as a standard product. The reason for P.P.D. not coming into general use is, of course, its high cost—80 injections for $2.00—whereas O. T. yields 10000 injections for the same amount. Considering the financial difficulties involved in such projects, we might have to content ourselves with a 1/1000 O.T. altho the P.P.D. is far more desirable as a standard diagnostic material. We would suggest to the manufacturers, in order to reduce costs of P.P.D., that they should make available separately the first and second strengths as well as the buffered diluent. Those who have facilities, may prefer to prepare their own diluent. If the diluent were marketed separately, the second strength could be used in place of the first strength by diluting with 10 times the amount indicated. In individual cases this scheme will prove even more advantageous since not all first tests need to be repeated by any manner of means. Finally, if P.P.D. is to come into general usage for private practice, a package for single injection at a nominal cost must be devised.

The X-ray of the Chest.

We have heard much controversy regarding the relative value of the celluloid film, paper film, and fluoroscope as a diagnostic procedure. All other factors

being equal, there can be little question as to the superiority of the celluloid film in fineness of detail, over the other two methods. This being a case-finding undertaking in mass, the question of economy again enters largely into the picture and that method which offers the best results for the amount of money available should be the one chosen. Here we wish to stress the point that it is of far greater importance to make sure of the competence of those who interpret the findings than the choice of a particular film. Frankly, we would by far prefer the fluoroscope in competent hands, though it is the least reliable of the three procedures and involves taking a chance of missing not over 5 per cent of insignificant lesions, to the best film obtainable in the hands of an incompetent diagnostician.

Considering the importance of a correct interpretation of the findings, it would be equally desirable to agree on a uniform terminology. Whether we like it or not, the case finding program will be best served, until a better one is evolved, by following the classification outlined in the Diagnostic Standards of the National Tuberculosis Association, 9th Edition, 1931. It is not within the scope of this discussion to enter into a detailed analysis of this classification. It is germane, however, to point out that Childhood Type of Tuberculosis as defined in the National Diagnostic Standards is recognized on x-ray films chiefly, though not wholly, because of the calcium deposition which takes place in the primary lesion in the course of its healing process. Unless these cases show some clinical manifestations of active disease, there is no reason for singling them out for special care. All reactors have a focus of tuberculosis somewhere in the body whether we can visualize it on the x-ray film or not, and all of the reactors will bear following up as to source of infection and as to need of admonitory advice, regular hours of rest, fresh air, and proper nutrition. Only those showing clinical activity will require special attention. All of this can be readily carried out at home. Institutional care should be reserved for those with frank adult type lesions or open tuberculosis only, which are exceedingly rare in children of primary school age.

The Sponsorship.

The scene of action as well as the subjects of our study being the school, school personnel, and school children, it seems right and proper that the school authorities should be the sponsors for the tuberculosis case-finding program, stimulated and guided by the Tuberculosis League, the Tuberculosis Division of Boards of Health, or the sanatorium. These sponsors must be backed by the authority of the schools and must assume the responsibility of informing the parents or guardians of the results and the necessary after care. All cases requiring medical attention should be referred to the family physician, or, when indigent, to the clinic.

The Examining Physician.

Unless the examiner is well qualified and thoroughly experienced not only in x-ray technique and interpretation but in all the phases of the tuberculosis problem, the entire project falls flat and is worse than useless. Much harm can be done by inexperience or lack of judgment. If we bear that in mind we shall have but little difficulty in choosing the right examiner. It should be wholly unnecessary to mention that the examiner is entitled to a reasonable compensation. The idea, however, is still prevalent that the doctor should donate his services for such a good cause.

Summation.

It is quite evident from the preceding considerations that it is not at all an easy matter to formulate a plan for uniformity of procedure or a standardized technique in the tuberculosis case-finding process. Some facts stand out clear enough to be readily acceptable, while others may require further elaboration and experience. The following suggestions should there-

(Continued to page 26)

The Collapse Program in Pulmonary Tuberculosis

BY
C. A. THOMAS, M.D., F.A.C.S.
S. C DAVIS, M.D., F.A.C.P.
Tucson, Arizona

THE DEVELOPMENT of collapse therapy in the treatment of pulmonary tuberculosis has been a gradual evolution through the past quarter of a century. Pneumothorax, which was the first attempt at collapse, was used and popularized largely by internists. Gradually the subject of collapse attracted the attention of more daring souls, the surgeons, and they together with the internist and physiologist further developed the subject until today we have many proven collapse procedures for the treatment of this disease. These procedures are referred to here as collapse measures. The individual, combined, and successive use of these measures represent what we are pleased to call the collapse program. With the use of these surgical measures in the treatment of pulmonary tuberculosis, the classification of this disease has been completely changed, in the minds of many physicians, from a medical to a surgical disease.

During this evolutionary period, not only has there been development of new procedures but much change of thought in the minds of doctors and lay people has taken place. This change of thought has been so great that the one time glorious phthisiologist has now lost cast to the point that he is almost antiquated, unless he has been the unusual fellow who was aggressive and has kept up with the procession of rather rapid changes.

Notwithstanding the fact that much progress has been made in the use of collapse therapy in this disease, there is still much to be accomplished; especially is there great need for further change in the minds of the medical profession, particularly those who devote themselves to the treatment of pulmonary tuberculosis. All too many of these are still thinking in terms of chronicity and sufficient advancement of the disease process to justify collapse. Many men who are real enthusiasts in the use of collapse measures in chronic cases seem not to have gotten far enough in their thinking to quite realize that no other disease is permitted to continue its ravages until far advanced before effective measures are used. Before collapse therapy reaches its greatest usefulness, this hurdle between the treatment of acute and chronic tuberculosis has got to be made by all, as it has been made by a few pioneers in this field.

The proper use of minor or revocable procedures in early cases of pulmonary tuberculosis has been proved, in our hands as well as in the hands of others, to be able to effect an arrest and often a rapid cure in a large percent of cases, thus avoiding a long siege of morbidity, if not a mortality, as is so frequently the case where cavernous and purulent lesions are permitted to develop before collapse is instituted. We can see nothing rational in waiting until wide-spread and cavernous lesions appear with their complications of adhesions and pyogenic infections. Such complications at once make almost certain bronchiectatic and atelectatic complications as well as certain sepsis, with its further disabling effects. The development of these mechanical factors makes collapse more difficult and hazardous in that they often require major collapse procedures to be effective; furthermore, while collapse may be obtained in such cases by the major procedures, in many the previous development of bronchiectatic dilatation and sepsis cause continued morbidity and prevent complete economic restoration. The intelligent application of surgical measures in the earliest possible stages of practically all cases of this disease would soon render almost obsolete the operation of thoracoplasty, extra-pleural

pneumonolysis and all such procedures as are indicated in far advanced cases. In other words the need for thoracoplasty in any individual case is positive evidence of mistakes of the past.

The treatment of tuberculosis is no longer a one-man job. It requires the combined judgment of a well-rounded staff consisting of at least one or two internists, a surgical staff trained in the use of all collapse measures, an otorhinolaryngologist, and a gastro-enterologist. Radiological and clinical laboratories are also essential. One sanatorium of 100-bed capacity, of which we have charge, has such a staff and we carry from 80 to 90 percent of all cases under some form of collapse therapy at all times. The only patients in this institution who are not under collapse are the new arrivals and those who are considered entirely hopeless.

The surgical treatment of pulmonary tuberculosis is the greatest advance in the treatment of this disease since the sanatorium or bed rest regime was established almost fifty years ago. From our viewpoint, pulmonary tuberculosis is a surgical disease from the time the diagnosis is made. Patients with this disease are as much entitled to surgery as patients with acute appendicitis. It is no longer a question of radical or conservative surgery but a question of rational treatment, and the earlier collapse is applied the better.

There are ten different proven procedures for use in the collapse treatment of pulmonary tuberculosis:

1. Sanatorium Regime.
2. Pneumothorax.
3. Phrenic Interruption,
   a. Temporary,
   b. Permanent.
4. Oleothorax.
5. Scaleniotomy.
6. Bronchoscopy.
7. Internal Pneumonolysis,
   a. Open,
   b. Closed—Jacobeus.
8. Extrapleural Pneumonolysis—Plumbage.
9. Multiple Intercostal Neurectomy,
   a. Temporary,
   b. Permanent.
10. Thoracoplasty,
    a. Partial,
    b. Complete.

The collapse or surgical program in pulmonary tuberculosis contemplates the use of these different procedures in suitable cases according to the pathology present and the condition of the patient. They are used singly, in combination, and successively. Treatment is started in each individual case whether early or late with one idea in view, i.e., arresting the diseased process at the earliest possible moment to render the patient sputum and bacilli-free and to return him to economic efficiency. Judgment dictates that preference be given to the controllable procedure when there is a reasonable hope of cure, which is always the case in early, limited invasions whether unilateral or bilateral.

Judgment and experience also dictate that there should be no time wasted after the initiation of any one procedure when it fails to produce results readily. Any procedure failing to produce prompt results should be supplemented with some other procedure or withdrawn at once, and a different procedure instituted which offers greater hope of being effective. Much valuable time is often wasted and many lives sacrificed by depending on some one ineffective or partially effective measure when some completely effective measure is available and suitable. Contrary to the old teaching on this subject, "Time is really the essence of success in the treatment of this disease." The application of these ideas illustrate the need for constant and intelligent team work in each individual case from the time the patient comes under observation.

Nothing short of a complete surgical program, using the different procedures according to the indication present in each individual case, will bring the maximum results in all cases. Individual lesions and their distribution determine which one or which combination of these

procedures should be used. Bilateral lesions are not a contraindication for surgical treatment but only make the use of collapse procedures more imperative.

No indications for nor description of the technique of the minor procedures will be undertaken in this paper. These are fully dealt with in textbooks and current literature. Since the subject of thoracoplasty in its modern aspects has not appeared in the textbooks as yet, this subject will be dealt with briefly.

Thoracoplasty.

The original or German conception of this operation was a massive collapse of one hemithorax executed at one operation. The attending 50 percent mortality was prohibitive even though some of the surviving patients were cured. Notwithstanding this high mortality, the idea was not abandoned but a rapid succession of changes ensued with two ideas in mind: (1) reduction of mortality; and (2) making the operation more effective. Instead of a 50 percent mortality with a few cases cured, the procedure has been so perfected that today in the best clinics of the United States it carries as high as 85 percent cures and a mortality no greater than other major surgical procedures. As late as three years ago these figures were not considered possible. The effective changes and modifications of the original operation which have brought about these results are too numerous even to mention here, but a few of the more important steps will be enumerated and a short description given. As we look in retrospect on the criteria of scarcely three years ago, the improvements up to date have been truly dramatic.

(1) The operation as originally planned was from below upward, that is commencing at the eleventh rib and removing short sections of all ribs including the first at one operation. The location and extent of the pathology was disregarded. The operation is now done from above downward and is adapted to the pathology present.

(2) The present incision starts one inch below the lower border of the trapezius muscle, as did the paravertebral incision, and swings around the scapula to the posterior axillary line or farther in heavy persons. The scapula can then be raised by cutting the upper digitations of the seratus-magnus muscle and exposing all the ribs from the first to the seventh. This type of incision permits removal of long sections of ribs, thus making the operation effective in a large percentage of cases including those with giant cavities.

(3) The number of stages was increased to two, and later the multiple stage procedure of Hedblom was adopted.

(4) More wisdom in the selection of cases added greatly to the reduction of the mortality and is still one of the intriguing problems that has not been entirely solved. It has been proved, however, that patients with productive lesions lend themselves best, and that acute, widespread, exudative lesions are a specific contraindication to thoracoplasty. It has also been learned that no patient should be operated upon until there is evidence that definite resistance to the infection is present.

(5) The operation is adapted to the pathology present in each individual case; that is, in apical lesions a partial thoracoplasty is done, collapsing only the apex of the lung, conserving all good lung possible. This only a short time ago would have been considered the rankest heresy.

(6) The removal of all of the first rib, including its costal cartilage, all of the second and third ribs, including the transverse processes, the costal cartilages and a portion of the sternum, if necessary, make it possible to close the largest apical cavities which by the older method could not have been closed. The conservative method of removal of these ribs is essentially as follows: Through the posterior incision, all of the first rib and long sections of the second and one-half of the third ribs, with their transverse processes, are removed at the first stage. Later, after the chest wall has stabilized (two

weeks or, better still, three or four weeks later), the second stage in the back is done, removing another section of the remaining portion of the third rib and long sections of the fourth and fifth ribs and their transverse processes. Subsequently an anteriolateral operation is done at which the first costal cartilage and the remaining portions of the second and third ribs with their costal cartilages are removed. Subsequent operations in the back in incomplete thoracoplasty are done in stages of not more than three ribs. In this way the mortality is kept low without interference with the effectiveness of the procedure.

(7) The painting of the periosteal surfaces with 10 percent formalin to retard the regeneration of bone is another decided advance. More time between stages of operation is thus possible. This has been no small factor in reducing the mortality. Formerly, without the use of formalin on the periosteal surfaces, it was necessary to do the succeeding stages in rapid succession, concluding the whole series of operations in three to four weeks, or before regeneration of bone in site of former operations. With the use of formalin, thirty, sixty or even ninety days delay is permissible, and in many cases advisable.

(8) Reduction of operating time, which is obviously important, has been made possible; limited operation and team work are the two factors.

(9) In partial thoracoplasty, where it is necessary to remove sections of only four, five or six ribs, resection of a portion of the scapula, as brought out by Holman, to make it fit snugly on the decostalized pleura has been found a splendid movement. The seating of the scapula in this manner aids materially the collapse, also limits paradoxical respiration, and prevents painful friction between its lower angle and the sixth and seventh ribs.

(10) Pre-operative treatment as regards emptying of cavities and bronchi of sputum before anesthesia has proved of great value in preventing bronchogenic spread.

(11) Postoperative treatment, which is most important, has lost many of its horrors since the modern operation has been adopted. Blood transfusions and oxygen tents are seldom needed. Morphine without atropine is administered freely. It is important to have the patient cough at regular intervals for the first forty-eight hours and raise the same amount of sputum daily as before operation. Five per cent sodium chloride solution, 300 to 500 cc. intravenously, followed by 2000 to 3000 cc. normal saline or Hartman's solution has been found to lessen nausea and vomiting and prevent abdominal distention. Since we have used these solutions as described, and discontinued the use of glucose, we have had no serious case of ileus, and the convalescence is usually comfortable and uneventful. Some exceptions have been reported by Thomas and Harper in the Journal of Thoracic Surgery.

Summary:

1. Pulmonary tuberculosis is a surgical disease and is best treated by early collapse measures.

2. Early diagnosis and early collapse will reduce the morbidity and mortality to a minimum.

3. Collapse measures should be used individually, collectively, and successively without loss of patient's time which means waste of opportunity.

4. The best results in collapse therapy are obtained through the co-operation of both internist and surgeon, in other words group practice.

5. Thoracoplasty has undergone many and rapid changes during the last five years, which has reduced the mortality on a par with other major surgical procedures, and effects cures in 85 per cent of the cases operated.

Reading time of papers in Diseases of the Chest, 5 to 15 minutes.

Hodgkin's Disease

BY
M. CHERNYK, M.D.
Denver, Colorado

WHILE TUBERCULOSIS is always to be kept in mind in making a diagnosis when a patient presents himself with obscure pulmonary or other suggestive signs and symptoms, nevertheless tuberculosis frequently becomes a dumping ground for numerous vague non-tuberculous conditions which assail mankind, and which on careful study and investigation can be properly diagnosed. One of these conditions, arising on account of early cervical glandular enlargement and either early or late pulmonary manifestations, is Hodgkin's disease.

This condition was first described by Hodgkins in 1832 and has since been variously designated as lympho-granuloma, psuedo leukemia, lymphosarcoma, malignant lymphoma, splenic anemia, chronic relapsing fever, lymphadenoma and anemia lymphatica. This confusing terminology illustrates the difficulty in arriving at a satisfactory classification of this condition which is considered an infection by some and a neoplasm by others. The histo-pathology in brief however is more suggestive of a neoplastic than of a granulomatous process. The typical form of the disease is characterized by a slowly progressive enlargement of the lymph glands throughout the system, a progressive secondary anemia, fever, and generally a fatal termination within three to five years.

Age and Sex.

Hodgkin's disease is most common in young adults and relatively rare after the fourth decade of life, but is not at all rare in childhood. Ziegler in reporting 220 cases found 16 and 17 percent respectively in the first two decades of life. The condition is twice as common in adult males as in females. In younger children in the first decade of life the predominance of males is very much greater, being approximately four to one. Smith of Ann Arbor, in reporting 23 cases in children up to 14 years of age, found only two females, while in six years at the same institution (The University of Michigan) the total number of adult cases reported showed 66 and 34 percent respectively for males and females. These percentages rather tend to nullify the theory held by some that the disease might be related in some way to repeated infections of some sort, as males are supposedly more frequently exposed to infectious agents by occupation. In the younger groups one would hardly expect the environment of one sex to differ greatly from the other. On the other hand it is logical to assume that the matter of sex points rather to the type of etiology for Hodgkin's disease as well as for leukemia or true lympho-sarcoma. Smith points out that of nineteen children with lymphatic leukemia fifteen were boys, while of eleven children diagnosed as having true lympho-sarcoma only one was a girl.

There are no constant reports in the literature relating Hodgkin's disease to preceding infections and possible foci of infection. Some observers have thought that conditions in the nasal sinuses, mouth, and throat play some etiologic role because of the common onset in the cervical glands. This however has not been found to be the case by those reporting large series of cases, aside from the fact that it would be difficult to associate Hodgkins' disease in very young infants with such an etiology. There does, however, seem to be a slight familial tendency to the disease, as several cases occuring in the same family are not at all rare, and it is particularly common in the same family in twins.

Relation to tuberculosis.

This relationship has been the subject of considerable study. Sternberg in 1898 thought that Hodgkins' disease was a

glandular form of tuberculosis, but Dorothy Reed and Longscope definitely decided that they are two separate disease entities. Not so long ago L'Esperance claimed he was able to produce avian tuberculosis by inoculating chickens with material extracted from the enlarged glands and has attracted fresh attention to the possibility of such a connection. Ewing states that family history showing tuberculosis or tuberculous lesions in the body is the rule in these patients. Ziegler, however, claims that it occurs in only about 20 percent of the cases. Parker and his associates in a study of pathologic rather than clinical material have found a significantly greater percentage of tuberculosis both healed and active in Hodgkins' than in other types of lymphoma. This author in the past several years, has observed two cases of Hodgkins' disease, one co-existing with an advanced pulmonary tuberculosis, and another with a minimal early upper lobe involvement. Both patients had positive sputum and both came to autopsy which confirmed the diagnosis of both conditions.

A rather interesting paradox is the relative infrequency of positive tuberculin reactors in Hodgkins' disease. Bastai suggests that this might be explained by a tuberculin anergy produced by the disease. He found that following radiation therapy, negative reactors often gave a positive reaction. It may be suggested that it is because of this anergy that tuberculosis is so often found associated with this disease and spreads so rapidly, particularly in view of the fact that many of these cases are wrongly diagnosed as tuberculosis and placed in sanatoria where they are continuously in close contact with the tubercle bacillus.

Symptoms.

The disease is very insidious in its onset and the usual history is the discovery of a painless, slowly enlarging gland. The most common site of enlargement is in the cervical glands and more frequently the glands of the left side are the first to be involved. Feer has offered this explanation: that there is truly a primary involvement of the retroperitoneal and messenteric lymph glands. By lymphatic extension such processes would first show themselves in the left neck glands, because of the course of the thoracic duct. This seems reasonable as even symptomatically many patients have constipation alternating with diarrhea and abdominal distress even early in the course of the disease. It also indicates the importance of directing radiation treatment to the abdomen as well as the cervical region which appears to be the only seat of involvement. No tissue in the body is exempt and the first involvement may even occur in the bones or central nervous system. Usually other tissues become infiltrated as the disease progresses, but it is found early in its course in the mediastinal, axillary, messenteric and inguinal glands. The spleen and liver are involved later in the disease and can be readily palpated. Their enlargement is a serious prognostic sign. Cutaneous manifestations frequently occur as a simple urticaria, petechiae, edema, bronzing or other non-specific lesions, or there may be actual dermal infiltration with the Hodgkins tissue.

As the disease progresses there occurs malaise, anemia, cachexia, and fever with certain sequellae resulting from pressure of tumorous glands such as nausea, vomiting, diarrhea and abdominal distress from messenteric involvement, or respiratory difficulties from encroachment on the bronchi and mediastinum such as to produce symptoms resulting from atalectasis, abscess formation, or pleural effusion. Parasthesias can occur from pressure on the nerves as also delirium and palsies from central nerve involvement. As the disease progresses, fever is usually a constant feature and ranges from 100 to 104 degrees.

The blood picture generally shows nothing characteristic except a progressively increasing anemia, a relative increase in lymphocytes and a relative leukopenia,

(Continued to page 28)

Common Errors in Diagnosis

BY
ROBERT K. CAMPBELL, M.D.
Springfield, Illinois

EARLY pulmonary tuberculosis is frequently overlooked and we have tried in a general way to answer the question WHY, as we reviewed 4,693 case records recently at St. John's Sanitarium, Springfield, Illinois.

Even today, the majority of patients are advanced when first admitted to the sanitarium, although we have noticed a very marked change during the past ten years. Ten years ago, histories given us by patients indicated that a fairly large percentage of them had been to a number of doctors before tuberculosis was discovered as the cause of their illness. Today, I am pleased to state this does not happen nearly as often. Ten years ago we had only a small percentage of patients who came for observation and diagnosis. During the past ten years there has been a steady increase in this percentage and we now have a large number who have been admitted for observation and diagnosis. This is very encouraging for it means that the general practitioner is no longer satisfied to take the responsibility of advising his patient until all evidence obtainable is before him, especially in doubtful cases.

In looking for the most common and therefore the most important causes of failure to recognize an early pulmonary tuberculosis, we believe at the present time in this part of the country that the most important cause is the FAILURE OF THE PATIENT TO SEEK MEDICAL ADVICE WHEN SYMPTOMS FIRST APPEAR and the failure, frequently, of cooperation with the doctor during the period of early development of the disease. This attitude on the part of the patient is probably the result of lack of appreciation of the need of seeking medical advice early in any and all sickness and, of course, his lack of realization of the nature of tuberculosis which is frequently a misleading disease, progressing over months or even years without alarming symptoms.

The doctor's main error, speaking generally, appears to be not a lack of knowledge but a failure to insist on having all possible evidence before him before he is satisfied with a diagnosis.

The doctor in general practice sees the early case first, and if the case is typical he seldom errs in his diagonsis; but with a considerable percentage of the cases atypical, it is necessary that he keep tuberculosis in mind as a possibility even where other illness appears more likely to be causing the symptoms, particularly if the symptoms present are common also in tuberculosis.

Among the more common errors DIGESTIVE DISTURBANCE is found misleading. According to many histories given, patients were treated over a long period of time for indigestion, thought to be due to improper diet or health habits in a nervous or overworked individual. Many of these patients appeared to have symptoms of ulcer and were treated for this condition. Others were treated for colitis or liver and kidney trouble, and quite a large number had appendectomies which did not result in relief from symptoms. In most of these cases the symptoms were not typical of the condition being treated, although they were suggestive. In most of these cases, during the preceding years, the patient had been given a careful examination by the doctor in his office including history, physical examination of the chest, blood pressure, and urinalysis. In most of these cases the doctor appeared satisfied when the physical examination of the chest was negative and an x-ray of the chest was not taken (had a film of the chest been made, the condition would have been evident). When illness of this nature does not respond to treatment in a short time, make x-ray films and sputum tests and

ASHEVILLE
NORTH CAROLINA

"The Land of the Sky"

AMBLER HEIGHTS SANITARIUM
A modern sanitarium fully equipped for the treatment of pulmonary tuberculosis

Descriptive literature upon request

Edwina M. Richardson, R. N., Supt.

ASHEVILLE NORTH CAROLINA

ZEPHYR HILL SANATORIUM
For the treatment of tuberculosis and chronic diseases of the chest.

Medical Staff:

C. H. Cocke, M.D.

S. L. Crow, M.D. J. W. Huston, M.D.

Mrs. W. I. Abernethy, R.N., Superintendent

ASHEVILLE NORTH CAROLINA

ST. JOSEPH SANATORIUM
(Conducted by the Sisters of Mercy)

Fireproof, steam heat. All rooms have private sleeping porches with private or connecting baths.

Graduate nurses in attendance.

ASHEVILLE NORTH CAROLINA

VIOLET HILL SANATORIUM
Owned and operated by Mrs. Florence Barth

Each room has a sleeping porch with southern exposure. Free automobile transportation to Town

ASHEVILLE Reasonable Rates NORTH CAROLINA

Mountain View Sanatorium
"Equitable All Year Round Climate"

Registered nurse in charge.

Open to all reputable physicians.

LENA CLAREMONT, R.N., Superintendent

Kerrville, Texas.

San Angelo Sanatorium
For the Care and Treatment of Tuberculous Patients.

"Ideal All Year Climate"

Mrs. J. S. FORRESTER, Manager.

T. D. SHOTTS, M.D., Medical Director.

San Angelo, Texas.

HOLY CROSS SANATORIUM (Non Sectarian) In the Health Zone of the Nation

A large, modern, privately owned, 250 bed Institution, comprising 500 acres, with Truck Garden, Poultry and Dairy Farms. Well balanced menus.

A "Home away from Home," with each Room and Ward adjoining a private, airy sleeping porch. Also private rooms with bath.

A beautiful, restful Health Resort, with separate Units personally supervised, and having every Medical aid and wholesome entertainment. X-ray and Clinical Laboratory work, Artificial Pneumothorax, Heliotherapy and Ultra Violet Ray. Competent medical and nursing staff. Radio, Microphone with ear-phone connections to each bed.

Located in the Health Zone of the nation with ideal year-round climate. Altitude 4,330 feet. Water 99.99 per cent pure. RATES $15.00 to $22.50 A WEEK

SISTERS OF THE HOLY CROSS, Supervisors . . Holy Cross, New Mexico

ST. LUKE'S In The Desert
TUCSON, ARIZONA

For the Treatment of Pulmonary Tuberculosis.

A Sanatorium maintained by the Episcopal Church for men of moderate means regardless of Church affiliations.

RATES: including Medical Attention, $12.00 per week.

Herman O. Rasche.....Superintendent
Samuel H. Watson, M.D.....Medical Director
W. R. Hewitt, M.D.....Physician in Charge

in children tuberculin tests, seek for a history of contact, and if necessary place the patient under close observation before eliminating tuberculosis.

Neurasthentic Patients are frequently treated over a long period of time for various conditions which are not clearly diagnosed. A search may be made for focal infection, for menstrual disturbance, or for various other conditions which might account for the nervous state, the diagnosis only becoming clear after x-ray films of the chest and laboratory tests are made.

Thyroid Cases, where the thyroid is thought to be the cause of ill health, are treated for this condition and operated without definite relief of the symptoms or improvement in the patient. Further examination, sometimes at a considerably later date, will disclose a pulmonary tuberculosis which was present before the thyroid gave trouble (we must not forget it is a common symptom of tuberculous toxemia for the thyroid gland to become involved and the pulse to become quite rapid).

Infection of the Upper Respiratory Tract is a very common cause of error and must be carefully differentiated from early tuberculous infection in the chest. We find from a history of these patients that a considerable number were treated for sinus infection or diseased tonsils or teeth, which conditions were believed to be the sole cause of their illness. However, the patient failing to improve should be immediately given the benefit of a search for other cause of illness including chest x-ray, etc.

Conditions with Symptoms pointing Directly to the Chest are not so commonly mistaken as the preceding; however, they still show frequent mistakes. Acute bronchitis may remain a satisfying diagnosis over too long a period of time while the real cause of the symptoms (tuberculosis) may be spreading. In the meantime these patients are frequently a source of danger to others. Asthma is often misleading and requires detailed evidence for diagnosis. Influenza, very commonly reported in the history as the beginning of "lung trouble" may not have been watched closely enough by the doctor to make sure of a complete recovery in a reasonable length of time. Dust inhalation not only satisfies many patients as to the cause of their chronic cough but occasionally appears to satisfy the physician also without a complete examination including x-ray and laboratory tests.

In all cases with symptoms involving the chest, an x-ray film should be insisted on and laboratory examinations made, including repeated concentration sputum tests (and bear in mind negative sputum tests do not rule out tuberculosis).

Less Common Errors, although still common enough to require mention, include pleurisy, especially with effusion, which was not followed by careful examination or supervision; at a later period a far advanced pulmonary tuberculosis was recognized. The same is to be said of hemoptysis which was thought to be due to a cardiac or throat condition. Rectal abscess or fistula occasionally is not followed up for a complete diagnosis. Hoarseness, especially if complained of at intervals only, may be passed by without complete examination. Even continued cough and expectoration may not lead to careful examination including sputum tests and x-ray. Remember that absence of physical findings in the chest does not exclude active pulmonary tuberculosis; it may show plainly in an x-ray film. Loss of strength, loss of weight, occasional temperature, increased pulse, irritable nerves may be laid to other causes without a searching examination.

Errors of making a positive Diagnosis of Tuberculosis when it is not present are among the less common errors. When this does occur the real cause of the illness is generally found in the chest, next often in the upper respiratory tract, and occasionally in the digestive tract, thyroid, or elsewhere.

To get early cases of tuberculosis under treatment at a time when recovery can be expected, the patient must be more ready to seek advice. Further education relat-

GRACE LUTHERAN SANATORIUM

Owned and Operated by
The American Lutheran Church
For patients irrespective of denomination or creed

For Treatment of Tuberculosis
SAN ANTONIO, TEXAS
Address: Paul F. Hein, D.D., Supt.

A high class institution
Rates very moderate
Accommodations excellent

SUNMOUNT SANATORIUM

SANTA FE
NEW MEXICO

FRANK E. MERA, Medical Director

Known for over a quarter of a century for its comfortable accommodations, its excellent table, its views and interesting surroundings and its climatic advantages.

PORTLAND OPEN AIR SANATORIUM

MILWAUKIE, OREGON

A thoroughly equipped institution for the modern medical and surgical treatment of tuberculosis. An especially constructed unit for thoracic surgery. The most recent advances in pneumolysis applied to those cases demanding this branch of intrathoracic surgery.

MODERATE RATES

Descriptive Booklet on Request

Medical Directors: Ralph C. Matson, M.D., and Marr Bisaillon, M.D.
1004 Stevens Building Portland, Oregon

A modern and thoroughly-equipped institution for the treatment of all forms of tuberculosis. Beautiful accommodations for patients, including private suites with glass-enclosed sun parlors.

Medical equipment is complete, with everything used in the present day methods of diagnosis and treatment.
A home-like atmosphere is obtained at all times.

Chest Clinic and Out-Patient Department, 1018 Mills Building

HENDRICKS-LAWS SANATORIUM

EL PASO, TEXAS

CHAS. M. HENDRICKS and JAS. W. LAWS, Medical Directors

ing to the value of early treatment in all conditions pertaining to health is needed; health examinations at regular intervals are to be encouraged as a check on all diseases. The doctor, when the patient comes for help, must always keep tuberculosis in mind as a possibility. He must not remain at ease with a diagnosis in mind based only on scant evidence, but must work to secure all possible evidence before ruling out tuberculosis. When he does this, these more common errors in diagnosis will seldom occur. It is not our lack of knowledge but our lack of thoroughly working out the details of the case that causes the error. *More Work—Less Error.*

With our present knowledge is there anything more important in the entire field of tuberculosis than encouraging the patient to seek advice early and reducing the errors in diagnosis? These steps would greatly increase the number of recoveries and lead to further progress in the field of prevention.

STANDARDIZATION OF TUBERCULOSIS CASE FINDING PROCEDURE IN SCHOOLS—(Cont. from p. 15)

fore be considered as tentative and subject to revision as future experience and new discoveries may dictate:

1. Insistence on a frank statement to the public that to be of value, the tuberculin testing of non-reactors and x-raying of the chest of reactors must be repeated yearly, conducted by competent and experienced personnel only. In order to conserve funds, such tests to be restricted to higher age groups and to include teachers and school nurses of all grade schools.

2. Emphasis to be placed on finding the open adult type of tuberculosis in its communicable stage.

3. Legislation for compulsory proof from school personnel of freedom from pulmonary tuberculosis in its infectious stage.

4. Wherever practicable the uniform use of the Mantoux method of tuberculin testing in 1/1000 dilution of O.T. preferably the P.P.D. equivalent of one injection only in mass testing; in individual testing in clinic and private work, however, a second test with 1/100 or its equivalent being recommended. Suggestions to be made to manufacturers for the reduction of the cost of P.P.D.

5. The x-ray examination to be considered satisfactory with either paper or celluloid film or fluoroscope, the competence and experience of the interpreter and the technician being the all-important factor.

6. The school authorities to assume the sponsorship of the entire project, aided by the Tuberculosis League, the Tuberculosis Division of the Board of Health, or the Sanatorium authorities where available.

7. Only physicians trained in tuberculosis work, with a broad view of the tuberculosis problem to be considered as qualified to conduct tuberculosis case-finding projects in schools and entitled to reasonable compensation.

PARTIAL BIBLIOGRAPHY OF MORE RECENT DATE:

R. E. Plunkett, American Journal of Public Health, May, 1934.

H. E. Kleinschmidt, American Journal of Public Health, June, 1934.

Weber, Murphy and Holcomb, American Review of Tuberculosis, September, 1935.

Harrington, Meyers, and Levine, Journal of American Medical Association, May 25. 1935.

H. A. Myers, Inez Torp, Journal Lancet, April 1, 1935.

McCain, Thomas and Seemner, American Review of Tuberculosis, August, 1935.

T. N. Horan, American Review of Tuberculosis, August, 1935.

R. H. Stiehm, American Review of Tuberculosis, August, 1935.

E. L. Opie, Abstracts of Transactions—31st Annual Meeting, National Tuberculosis Association, 1935.

J. A. Myers, Abstracts of Transactions—Annual Meeting, National Tuberculosis Association, 1935.

Chas. E. Shepard, American Journal of Public Health, October, 1935.

Fellow, American Journal of Public Health, February, 1935.

Palmer Sanatorium

SPRINGFIELD
ILLINOIS

A Private Sanatorium of the Highest Class. Very moderate inclusive rates with no extra charges. Fully approved by the American College of Surgeons. Unusual refinements of service. New and modern buildings and equipment.

A CONVALESCENT SECTION for non-tuberculous convalescents.

Circulars on request: **Dr. George Thomas Palmer,** Medical Director.

SOUTHERN SIERRAS SANATORIUM

BANNING, CALIFORNIA

Location, near but not directly on the desert (altitude 2,400) combines best elements of desert and mountain climates. . . .A sustained reputation for satisfaction, both among physicians and patients. . . .Send your next patient here, and you may be assured of his receiving maximum benefit, and of his full gratitude.

C. E. Atkinson, M.D......Medical Director

Southwestern Presbyterian Sanatorium

ALBUQUERQUE,
NEW MEXICO

A well-equipped Sanatorium in the Heart of the Well Country. Rates $60.00 and $65.00 a Month. Rooms with Bath at higher rates. Write for Booklet.

MARYKNOLL SANATORIUM

MONROVIA **(Maryknoll Sisters)** **CALIFORNIA**

A sanatorium for the treatment of tuberculosis and other diseases of the lungs. Located in the foothills of the Sierra Madre Mountains. Southern exposure. Accommodations are private, modern and comfortable. General care of patient is conducive to mental and physical well being.

Sister Mary Edward, Superintendent — **E. W. Hayes, M.D., Medical Director**

ST. VINCENT SANATORIUM

Information and Rates on Request

TUBERCULOSIS IN ALL FORMS
Robert O. Brown, M. D.
Medical Director

SANTA FE
NEW MEXICO
Conducted by SISTERS OF CHARITY

THIRTY-FIVE YEARS OF UNRIVALED SERVICE FOR THE SICK HAVE MADE

St. Joseph Sanatorium and Hospital

ALBUQUERQUE, NEW MEXICO

The Most Beloved and Famous Institution of the Southwest

A 200 K.V.P. SHOCK-PROOF DEEP THERAPY MACHINE HAS RECENTLY BEEN INSTALLED

HODGKIN'S DISEASE—Continued from page 21).

particularly when the temperature is taken into consideration. As the disease progresses towards its terminal stage these patients become bedfast with extreme weakness, progressive edema, and anasarca until death comes from sheer exhaustion.

The average duration of life is reported to be about three years, although there are instances on record of fifteen years duration. There are, on the other hand, definitely acute fulminating cases whose course terminates fatally in from three to eight months regardless of treatment. In the more common forms, however, the disease is insidious and more slowly progressive with remissions and relapses. Those who have the most prolonged course are those in whom radiation therapy has been started early in the disease.

Treatment.

Everything in the pharmacopea has been used with little or no benefit. Serum and vaccines, transfusions and autohemotherapy have been reported as beneficial by some observers. However, the disease terminates fatally in all patients, and treatment leads to no permanent results. The only treatment that gives symptomatic relief and prolongs life is roentgen therapy. There is no question that under radiation the enlarged glands undergo rapid involution with symptomatic relief and many patients have been well enough under this treatment to pursue their occupations and lead relatively normal lives for a certain length of time.

INTRAVENOUS THERAPY
of
PULMONARY CONDITIONS

The field of therapeutic application of intravenous medication has yet to be explored.

LOESER'S INTRAVENOUS SOLUTIONS

afford physicians an opportunity to test out the value of well established remedies by a more modern and scientific method. The unerring accuracy of composition and uniformity of Loeser solutions furnish a means of safe and exact determination of therapeutic value.

WE Offer:—

GUAIACOL 0.2 gm. and *Iodine* 45 Mg. in 20 c.c.
GUAIACALX *Guaiacol* .4 Gm. and Calcium 90 Mg. in 20 c.c.
CALCIUM CHLORIDE .25 Gm. in 5 c.c.—5% in 10 c.c. and 10% in 10 c.c.
CALCIUM GLUCONATE 10% in 10 c.c.—10% in 5 c.c.
CALCIUM GUAIACOL Sulphonate .66 Gm. in 20 c.c.
SODIUM IODIDE 2 Gm. Guaiacol 0.2 Gm. in 20 c.c.
HEMATONIC: Iron and Arsenic 64 Mg. Colloidal Iron Cacodylate 5 c.c.

LITERATURE AND COMPLETE LIST ON REQUEST

LOESER LABORATORY

23 West 26th St. New York City.

SEE BACK INSIDE COVER PAGE FOR SPECIAL SUBSCRIPTION OFFER.

The Pottenger Sanatorium *and* Clinic

Write for particulars
THE POTTENGER SANATORIUM AND CLINIC
MONROVIA, CALIFORNIA

For the diagnosis and treatment of diseases of the lungs and pleura; asthma and other allergic diseases; asthenics and others who require rest and supervised medical care . . . . An ideal all-year location. The grounds surrounding the Sanatorium are beautifully parked and add much to the contentment and happiness of patients.

Close medical supervision. Rates reasonable.

F. M. Pottenger, M.D. ..... Medical Director
J. E. Pottenger, M.D. ..... Asst. Medical Director and Chief of Laboratory
Leroy T. Petersen, M.D. ..... Asst. Physician and Roentgenologist
F. M. Pottenger, Jr., M.D. ..... Asst. Physician

ROCKY GLEN SANATORIUM

McCONNELSVILLE, OHIO

For the Medical and Surgical Treatment of Tuberculosis

DR. LOUIS MARK, Medical Director
677 N. High St., Columbus, O.

H. A. PHILLIPS, Superintendent
DR. D. G. RALSTON, Resident Med. Director
DR. A. A. TOMBAUGH, Resident Physician

Graduate Nurses

Where the science of treatment is first — Beautiful Surroundings — Reasonable Rates

BARFIELD SANATORIUM

In the Delightful Sunshine of Tucson, Arizona

EXCELLENT ACCOMMODATIONS

KARL BARFIELD
Managing Owner

SAMUEL H. WATSON, M.D.
Medical Director

METHODIST SANATORIUM

ALBUQUERQUE, NEW MEXICO

A modern sanatorium for the Tuberculous — Four large modern well-equipped buildings and fifty cottages surrounded by beautiful lawns and trees — Open to all physicians — Rates $50.00 to $75.00 per month — medical care extra.

MRS. MINNIE G. GORRELL, Superintendent

VON ORMY COTTAGE SANATORIUM

VON ORMY, TEXAS

FRANK C. COOL.....President
R. G. McCORKLE, M.D., Med. Dir.
W. R. GASTON.....Manager

An institution designed for the proper treatment of tuberculosis patients at moderate rates. Beautifully located on the Medina River near San Antonio, Texas. Splendid all year 'round climate. Our own dairy and egg supply. Artificial pneumothorax used where indicated. Hopeless last stage cases not admitted. Weekly rates $15.00, $17.50, and $22.50. For booklet please write the manager.

MORE ABOUT THE ENDOCRINES, IN THE ACTIVE TREATMENT OF PULMONARY TUBERCULOSIS
(Continued from page 12).

waxy material necessary for the protection of the tubercle bacilli. If this is true, it appears that a more rich supply of cystine would be indicated in the diet, thus sparing nature the necessity of tearing down a considerable quantity of protein to get the required amount of sulphur for calcification. It may be that in the early process of the disease an impairment of the pancreas is effected which does not allow it to isolate this amino-acid from the protein molecule so it can be utilized. It is probable that if this is indicated a study might be made on the concentration of taurine in the bile of various animals to find one which would be capable of furnishing pancreatin extract with the required amount of enzymes necessary to furnish this available amino-acid.

As taurine is a rough index of the amount of cystine in the body, it might be that animals having a larger proportion of taurine in the bile may have this due to the exceptional activity of their pancreatic enzymes to isolate this amino-acid.

Apparently the proteolytic enzyme of the pancreas is more complicated than would appear, because at times, even though it may apparently be acting normally as an enzyme, it is still not doing its complete work. In the case of asthma, hypersensitivity, etc., it has not separated the protein into its constituent amino-acids and has allowed some portions of the combined acids to enter the blood stream. It may be possible that part of this breaking down of amino-acid and particularly the cystine separation is lost in the case of tuberculous persons.

If Mr. Owen's idea is correct about the depletion of the sulphur containing amino-acids in the body, giving the pancreatic extract will necessarily replenish the amino-acids required for repair. In this case one would find the same state of affairs existing as in the calcium content of the blood plasma—sufficient amounts, but inability on the part of the endocrines to play the major part in their utilization.

I wish particularly to think Miss Viola Ellis of the San Antonio Regional Office, U. S. Veterans Administration for her many courtesies, and able assistance during the preparation of these articles.

ABSTRACT

Racial Aspects of Tuberculosis in Mexico, Donato G. Alarcon. Am. Rev. of Tuberculosis, Vol. XXXV, No. 1, p. 6.

The Author who is the Medical Director of the Tuberculosis Sanatorium of the Public Welfare of Mexico in Mexico City, discusses the tuberculosis mortality and morbidity rates among the Mexican population. He points out that tuberculosis mortality is particularly high among mixed-blood people (Spanish-Indian) because of their great number, crowded living conditions in industrial centers. These people are usually seen first in the advanced stage of the disease (70 per cent in the authors practice). They usually have a cauaexudative type of disease with little fibrosis. The immediate response to modern means of treatment is good. Race has no influence in the immediate results of artificial pneumothorax or other surgical procedures or in hygenic-dietetic treatment.

Mortality rate in Mexico is estimated at 69 per 100,000 population. The rate in Mexico City has dropped from 500 in 1900 to 130 in 1930. The author believes this due to better living and working conditions in Mexico.

The author also points out that the average Mexican family consists of five—the natality rate being higher than the United States. This together with the poor living conditions increases the incidence of the disease.

PRICE SANATORIUM
2729 Porter Ave. El Paso, Texas
Located in the foot-hills—Beautiful scenic background — Home like atmosphere — Small private sanatorium where individual attention is the keyword—All rooms adjoining sun-porches—Moderate rates—Graduate nurse in constant attendance - - -
Write to **E. D. PRICE, M. D., Physician in Charge.**